

Part No. 1F8038

08May03

***Kodak* Medical X-ray Processor, Model 104**

Service Manual



Table of Contents

Table of Contents

Installation Data	3
Trouble Shooting.....	4
Spare Parts List.....	10
Wiring Diagrams.....	17

The information contained herein is based on the experience and knowledge relating to the subject matter gained by Eastman Kodak Company prior to publication.

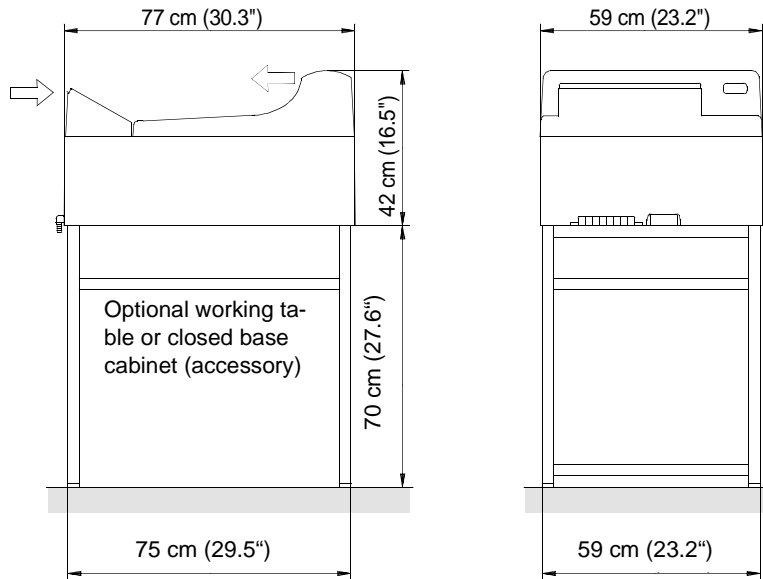
No patent license is granted by this information.

Eastman Kodak Company reserves the right to change this information without notice, and makes no warranty, express or implied, with respect to this information. Kodak shall not be liable for any loss or damage, including consequential or special damages, resulting from any use of this information, even if loss or damage is caused by Kodak's negligence or other fault.

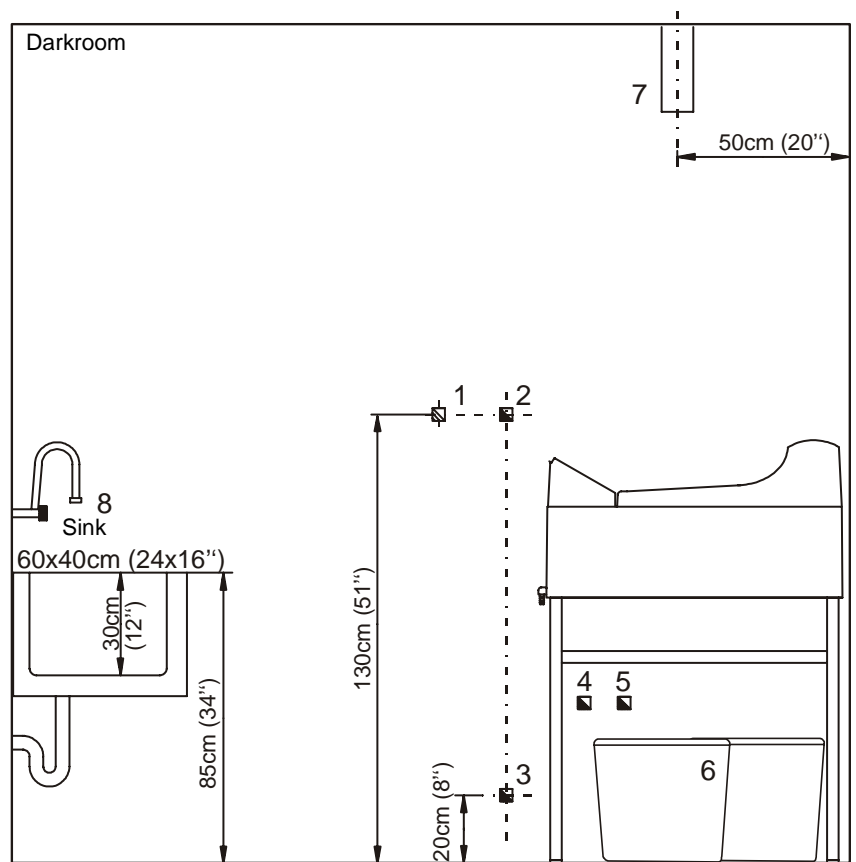
Copyright

© 2003 by Kodak. All rights reserved. Any reproduction, out of the limitation by the copyright law, needs written authorization by Kodak.

Installation Data



1. Wall socket
120 V, 15A (depending on machine model). Power lead should be equipped with GFI, Earth-Leakage Switch, 25 A / 30 mA nominal error-current. In addition, a wall disconnect switch can be installed.
2. Filtered fresh water connection
19 mm (3/4 in.) with stop cock, permissible pressure 20 - 85 psi, water temperature 5 - 25°C.
3. Drainage plastic pipe (PVC)
Ø 50 mm (2 in.) incl. syphon.
4. Drainage resp. collecting containers for used developer.
5. Drainage resp. collecting containers for used fixer.
6. Storing space for replenishment tanks: Below machine or externally.
7. Ventilation of darkroom is necessary. 10 room air exchanges per hour.
8. Sink with freshwater and flexible hose. Inner dimensions minimum (LxWxH)
60x40x30 cm (24x16x12 in.).



Measures and positions are recommendations

Trouble Shooting

Summary

1	Algae	5
1.1	Excessive algae growth in water tank	5
2	General	5
2.1	Machine has no power	5
3	Drive	5
3.1	Filmfeed out of order, dryer-fan is working	5
3.2	Machine does not start automatically	5
3.3	Machine doesn't stop automatically	5
3.4	Drive motor does not run	5
3.5	Transport stops before film comes out, changing the cycle time	6
3.6	Processing time and developer temperature relation	6
3.7	Changing the transport speed	6
4	Developer Bath	7
4.1	No circulation in bath	7
4.2	Developer temperature too high	7
4.3	Developer temperature too low	8
4.4	Developer temperature too low, fixer temperature too high	8
4.5	Removing the turning knob	8
4.6	Calibration of developer temperature	8
5	Film defects	8
5.1	Films will not dry	8
5.2	The film does not transport correctly	8
5.3	Scratches, pressure marks, dirt on film	8
6	Replenishment	9
6.1	Replenishment pump does not pump or not sufficiently	9
6.2	Replenishment rates are too high or too low	9
6.3	Adjust replenishment pump	9
7	Dryer	9
7.1	Dryer fan does not function or runs with reduced speed	9
8	Water	9
8.1	Rinsing water does not flow	9
8.2	Water tank overflows	9



The main components (circuit board, pumps, motors) of the processor are located underneath the tanks. To perform service you must drain the tanks, remove all racks, turn processor on side and remove bottom panel.

1 Algae

1.1 Excessive algae growth in water tank

Algae growth inside the water tank can leave residue on the films. When algae growth increases, countermeasures are required or the processor wash water can overflow:

- When work has been completed at the end of the day, drain water out of the machine.
- Clean dryer-wash rack regularly, use personal protective equipment recommended in the chemical's MSDS. Use soft sponge and soap to remove residue from the rollers.
- Install a filter system in the fresh water supply for the processor.
- If water tank overflows due to algae growth blocking the overflow hose, then the overflow hose can be connected directly to the connection at the water tank inside the machine.

2 General

2.1 Machine has no power

- Ensure that electrical socket has power supply.
- Check machine fuse in main switch.



Use manufacturer's fuses only.

- While power switch is on, check the following components: Voltage on contact of main switch - if no voltage - change main switch. Check input voltage at the circuit board. If the voltage is normal, exchange the circuit board. If no voltage, check the cable wiring harness.

3 Drive

3.1 Filmfeed out of order, dryer-fan is working

When placing processor cover on, the cover switch should be activated, re-adjust cover switch if necessary.

- Cover switch has no current passage when activated: Replace.
- Check chain wheel on motor and driveshaft, it may be loose.

3.2 Machine does not start automatically

Film switch is not correctly positioned or operator wire is bent. Re-adjust film switch and operator wire.

- Check following parts: Film switch, wiring of film switch and circuit board.
- Check wiring from circuit board to the connections of components (motor, fan, dryer heating, solenoid valve). If the connections have no fault then circuit board is possibly defective.

3.3 Machine doesn't stop automatically

- Display "film feed" is permanently illuminated: Wire band of film switch is jammed. Readjust wire.
- Check following parts: Film switch, wiring of film switch and circuit board.

3.4 Drive motor does not run

- Check cover switch.
- Check for proper voltage at drive motor.
- Dryer fan runs but no voltage on motor: Interruption in the wiring.

3.5 Transport stops before film comes out, changing the cycle time

The cycle time is the processing time which starts after a film has passed the film switch. Activate the switch in the infeed tray with a film and remove the film. Measure the time until the processor stops automatically.

Change cycle time if necessary. This can be accomplished by changing the position of the jumper on the upper side of the circuit board, which is located underneath the processor.

3.6 Processing time and developer temperature relation

The following chart demonstrates guide value relations between developer temperatures and processing times. Variations are possible depending on the various films and chemicals. Changing the transport speed see [3.7](#).

Processing time	Developer temperature
105 sec.	32 - 34°C (90 - 93°F)
139 sec.	31 - 33°C (88 - 91°F)

3.7 Changing the transport speed

The processing speed can be changed by changing the gear wheels. To do this the tanks need to be emptied and the machine turned over. After removing the drive motor the chain gears can be changed. Please note that the jumper on the circuit board needs to be placed to the indicated position.

Following gear combinations are available:

Film Size (cm)	Cycle Time ¹ (seconds)	Drop Time ² (seconds)	Transport Speed cm/min (in/min)	Motor and Driveshaft Gearing		Jumper position
				120 V 60 Hz		
				G _M	G _S	
24 x 30 ³	90*	116	55.5 (21.8)	16	16	2-3
	105	136	47.5 (18.7)	14	16	2-3
	135	174	37 (14.6)	12	18	1-2
35 x 43 ⁴	90*	136	55.5 (21.8)	16	16	2-3
	105	159	47.5 (18.7)	14	16	2-3
	135	204	37 (14.6)	12	18	1-2

1. Lead Edge In to Lead Edge Out

2. Dry to Dry

3. 30 cm edge fed into processor

4. 35 cm edge fed into processor

G_M Motor Gear

G_S Driveshaft Gear

* The 90 second cycle is only to be used with certain films. Test for proper drying of all film types used. Kodak blue sensitive films cannot be used with the 90 second cycle.

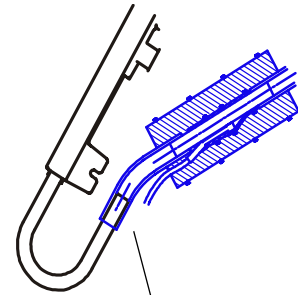
4 Developer Bath

4.1 No circulation in bath

- Circulation pump works but no circulation in bath: Air lock in heating and circulation system. Ventilate the circulation pump. See Page 8 in the Operator Manual, 1F8039.
- Particles in the pump chamber. The pump chamber can be easily opened by removing the four clips. When closing again ensure that the rubber seal is positioned correctly and not damaged.
- Check connection of pump, circulation pump possibly defective.

4.2 Developer temperature too high

- Check attachment of temperature sensor. This should be firmly positioned on tube and completely covered with foam rubber.
- Check sensor: At ambient temperature voltage between pin 3 (green) and pin 2 (brown) must be between 0.1 and 0.5 V.
- If the sensor has no fault then circuit board is defective.



Heat Exchanger and
Temperature Sensor

4.3 Developer temperature too low

- Check circulation pump. Air lock in the circulation pump: Ventilate the pump. See Page 8 in the Operator Manual, 1F8039. If no circulation can be detected: Check wiring of circulation pump; pump possibly defective.
- Bath is not heated: Check temperature safety switch on heat-exchanger. Check heating element: Current flow resistance: 120 V, 400 W heater = 36 ohms.
- Check temperature sensor (see 4.2).
- If no error can be found then electronic is possibly defective.

4.4 Developer temperature too low, fixer temperature too high

- Air lock in the circulation pump: Ventilate circulation. See Page 8 in the Operator Manual, 1F8039.

4.5 Removing the turning knob

- Pull the toggle off the knob by help of a flatnose pliers.
- Open the screw of the collet (Attention: don't loosen completely) and pull the knob out.
- When reinstalling the knob turn axis on circuit board to end position counter clockwise. Install the knob so that the pointer is at position of "Manual pumping".

4.6 Calibration of developer temperature

Deviating temperatures within +/- 1.5°C can be calibrated by a potentiometer on the circuit board. It can be reached after removing the turning knob (see page on right hand side) from above. Turning clockwise decreases the temperature.

5 Film defects

5.1 Films will not dry

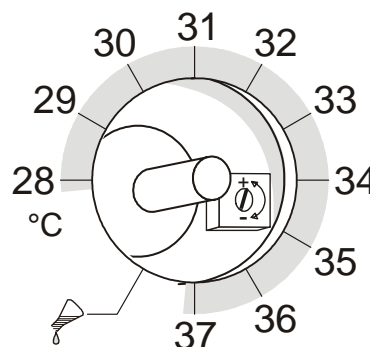
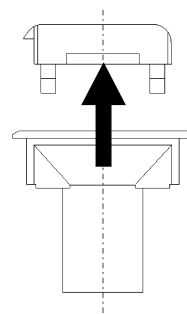
- No air comes out of air channel: Check wiring of dryer fan, fan is possibly defective.
- Cold air comes out of air channel: Check wiring of heating element in the air channel, heating element possibly defective. Check heating element current flow resistance: 110 V, 900 W heater =12 ohms.
- Hot air comes out of air channel, but the film is still not dried to satisfaction. Check chemicals and film type. The transport speed of the machine can be reduced to increase drying time (see 3.7).

5.2 The film does not transport correctly

- Check the positioning of the racks in the machine and make sure that the latches are closed.
- Check the roller racks: Position of the guide elements, rollers are in correct position and are not loose, flat springs are not bent, all gears are in place.
- Motor runs: The worm gear of the drive shaft should be secured with a splint to avoid twisting. Check the screws and positioning of the chain and chain wheel.

5.3 Scratches, pressure marks, dirt on film

- Straight scratches in the infeed direction indicate faulty guide elements. Check each rack and straighten up the guide elements. If mechanically damaged, replace the guide elements.
- Pressure marks caused due to dirty or damaged rollers. Check rollers for visible damage. Rubber rollers sometimes swell up. Replace defective rollers.



Trouble Shooting

6 Replenishment

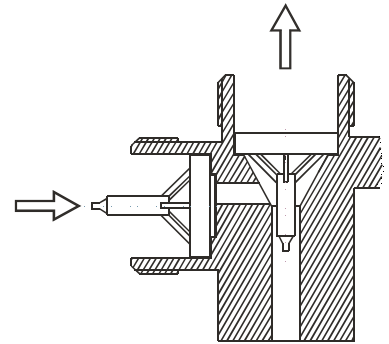
6.1 Replenishment pump does not pump sufficiently

- Clean valve inside connection tube.



Install valve insert correctly: Pay attention to flow-through direction!

- Check filter in the suction pipe (replenishment container) and clean it if necessary.
- Replenishment pump sucks air in. Check hoses and connections.
- Check eccentric position. Capacity approx. 240 ml/min at setting 85%.
- Activate the "Manual pumping" and while on, check the voltage of connection X2 on the power circuit board. If no voltage can be registered - exchange power circuit board.



6.2 Replenishment rates are too high or too low

- The replenishment rate can be changed by adjusting the stroke of the pump. To do this, the eccentric on the replenishment pump must be adjusted. Maximum pump capacity is 240 ml/min.

6.3 Adjust replenishment pump

- For the adjustment of the eccentric first open the allen screw on the big eccentric with the red line. If screw is not reachable, then start the replenishment pump by turning the temperature knob to "Manual pumping" until the allen screw is visible.
- Turn the eccentric so that the red line will be at the desired position and tighten the allen screw.



Minimum setting must not be below 60%.

7 Dryer

7.1 Dryer fan does not function or runs with reduced speed

- Check the fan wiring: bl = blue; bk = black; br = brown.
- If the fan is connected improperly, then the fan runs only half power.

8 Water

8.1 Rinsing water does not flow

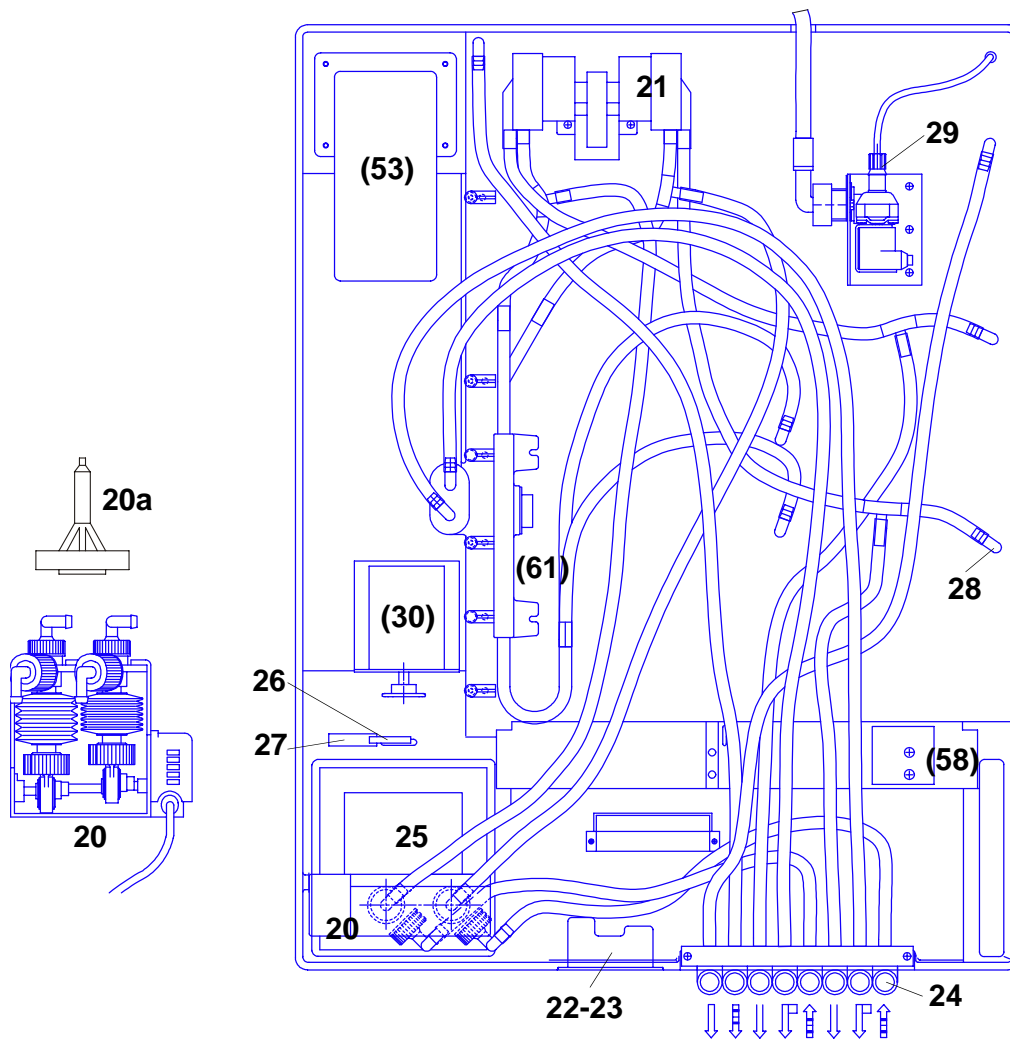
- Water pressure in the water system is too low: Minimum pressure 2 bar (20 psi).
- Valve activates, no flow passage - filter at inflow is blocked.
- Check green water inlet hose inside the machine.

8.2 Water tank overflows

- Water drainage hose (overflow) should have a constant fall. The hose end should be positioned above the drainage level in the syphon.
- Check water drainage in the tank and hose for dirt, algae, or blockage.
- When extreme algae growth is registered, the overflow can be connected directly onto the fitting of the water tank.

Spare Parts

Spare Parts

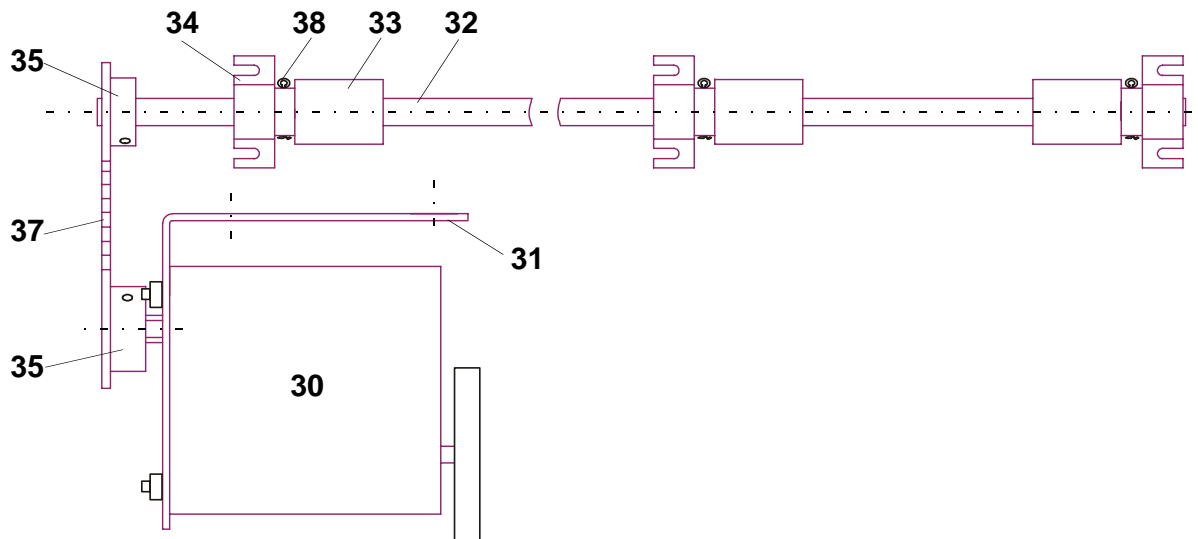


Pos.	Part No.	Description
20	1F7953	Replenishment pump
20a	*	Valve replen.
21	1F7954	Circulation pump 110 V, 50/60 Hz
23	n/a	Fuse, slow blow 10 A / 250 V
22 & 23	*	Main switch 110-120 V
24	n/a	Angle connection (grey)
25	1F7955	Circuit Board 110-120 V
26	*	Micro-switch, top cover
27	*	Operator for micro-switch
28	n/a	Angle fitting
29	n/a	Screw-in connector
-	n/a	Wiring harness V2 115 V
-	n/a	Drain Stop Cock

* available in Spare Parts Kit - Small, Part No. 1F7975

n/a - not available

Spare Parts

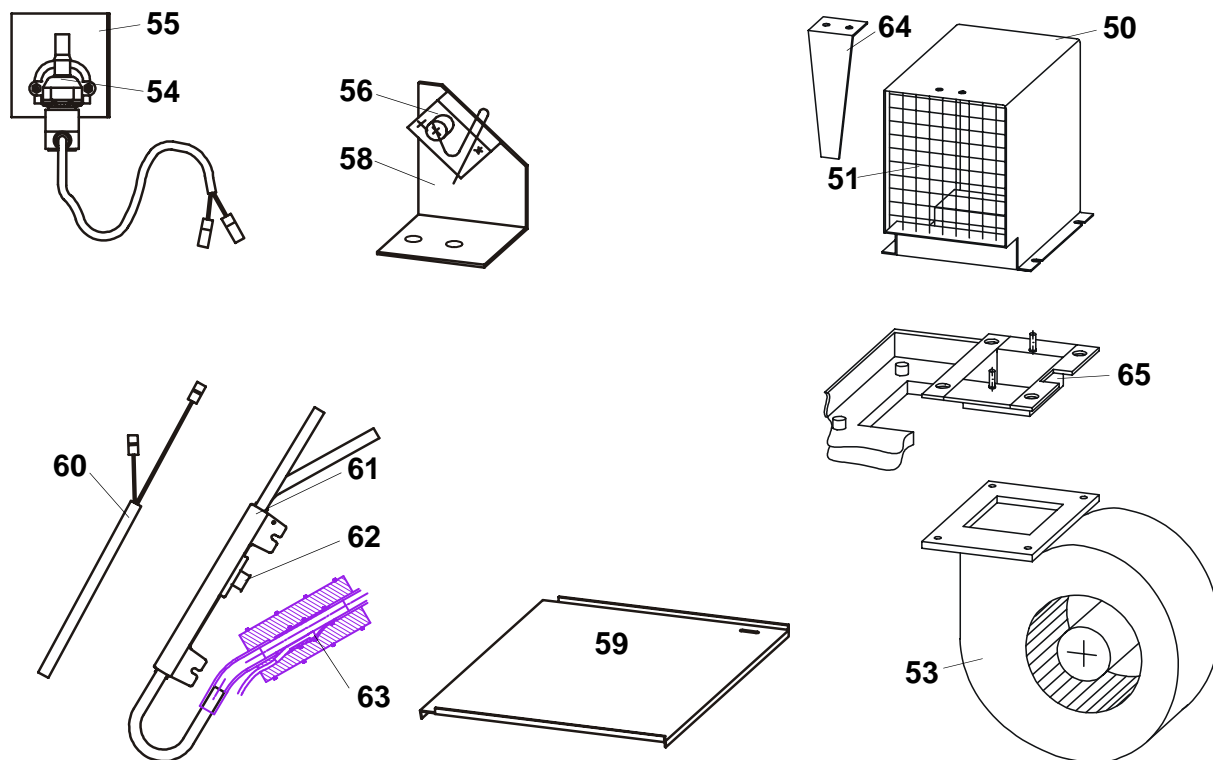


Pos.	Part No.	Description
30	1F7956	Main drive motor 120 V, 50/60 Hz
31	n/a	Motor bracket
32	n/a	Drive shaft worm-gear
33	*	Worm-gear
34	*	Bearing block
35	1F7898	Chain wheel t=12 Chain wheel t=14 Chain wheel t=16 Chain wheel t=17 Chain wheel t=18
37	n/a	Chain 6 mm with coupler link
38	*	Splint pin 2.0x20 mm, inox

* available in Spare Parts Kit - Small, Part No. 1F7975

n/a - not available

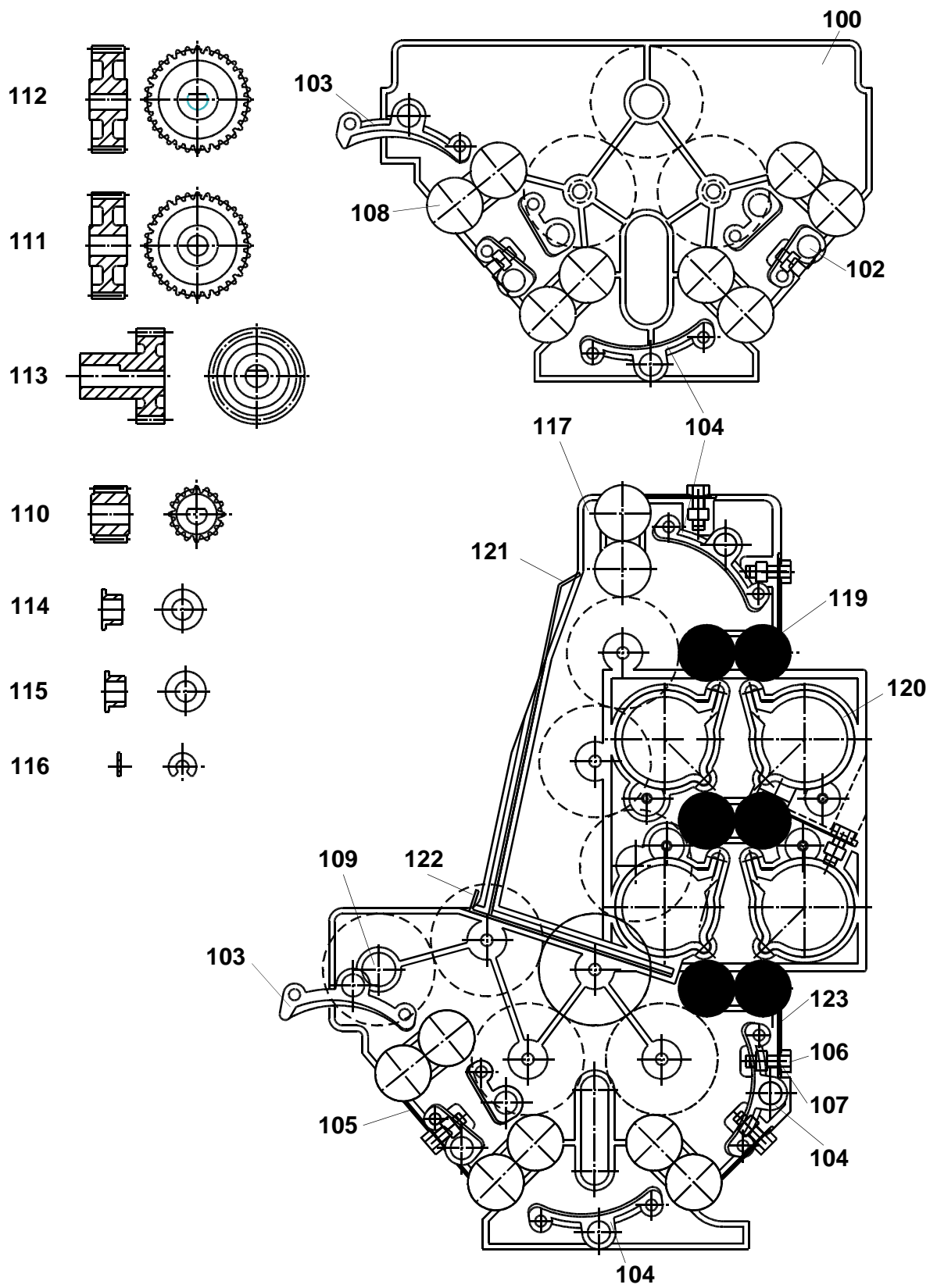
Spare Parts



Pos.	Part No.	Description
50	n/a	Air channel
51	1F7957	Dryer heating element 110 V, 900 W
53	1F7959	Dryer fan 115 V, 50/60 Hz
54	1F7960	Solenoid valve 115 V, 50/60 Hz
55	n/a	Securing bracket
56	*	Switch - film detection
58	n/a	Bracket for micro-rotary-switch
59	1F7961	Film feed tray
	n/a	Film feed tray graphic arts
60	1F7962	Developer heating element 110 V, 400 W
61	1F7963	Heat exchanger
62	1F7964	Temperature safety switch mounted on heat exchanger
63	1F7966	Temperature sensor
64	n/a	Plate for air channel
65	n/a	Channel dryer heating

* available in Spare Parts Kit - Small, Part No. 1F7975

n/a - not available



Spare Parts

Pos.	Part No.	Description
Standard Processor		
-	1F7972	Roller rack, developer
-	1F7973	Roller rack, fixer
-	1F7974	Roller rack, wash & dryer
100	n/a	Side plate dev. w. shafts (left)
	n/a	Side plate dev. (right)
	n/a	Side plate fix. w. shafts (left)
	n/a	Side plate fix. (right)
102	1F7967	Guide bar straight, short
103	1F7968	Guide bar with nose
104	1F7969	Guide bar, curved
105	*	Flat spring 55
106	*	Screw M4x10, A4
107	*	Hexagon nut M4, A4
108	1F7970	PU-roller 35 ground
109	n/a	Drive shaft rack
110	*	Gear t = 16, D-hole
111	*	Gear t = 32, round hole
112	*	Gear t = 32, D-hole
113	*	Worm wheel
114	*	Bearing
115	n/a	Bearing, large
116	n/a	Black circlip
117	n/a	Dryer side plate left w. shafts
	n/a	Dryer side plate right
119	1F7971	Rubber roller 35
120	n/a	Air jet (35)
121	n/a	Dryer plate, large
122	n/a	Dryer plate, small
123	*	Flat spring 35

* available in Spare Parts Kit - Small, Part No. 1F7975

n/a - not available

Spare Parts

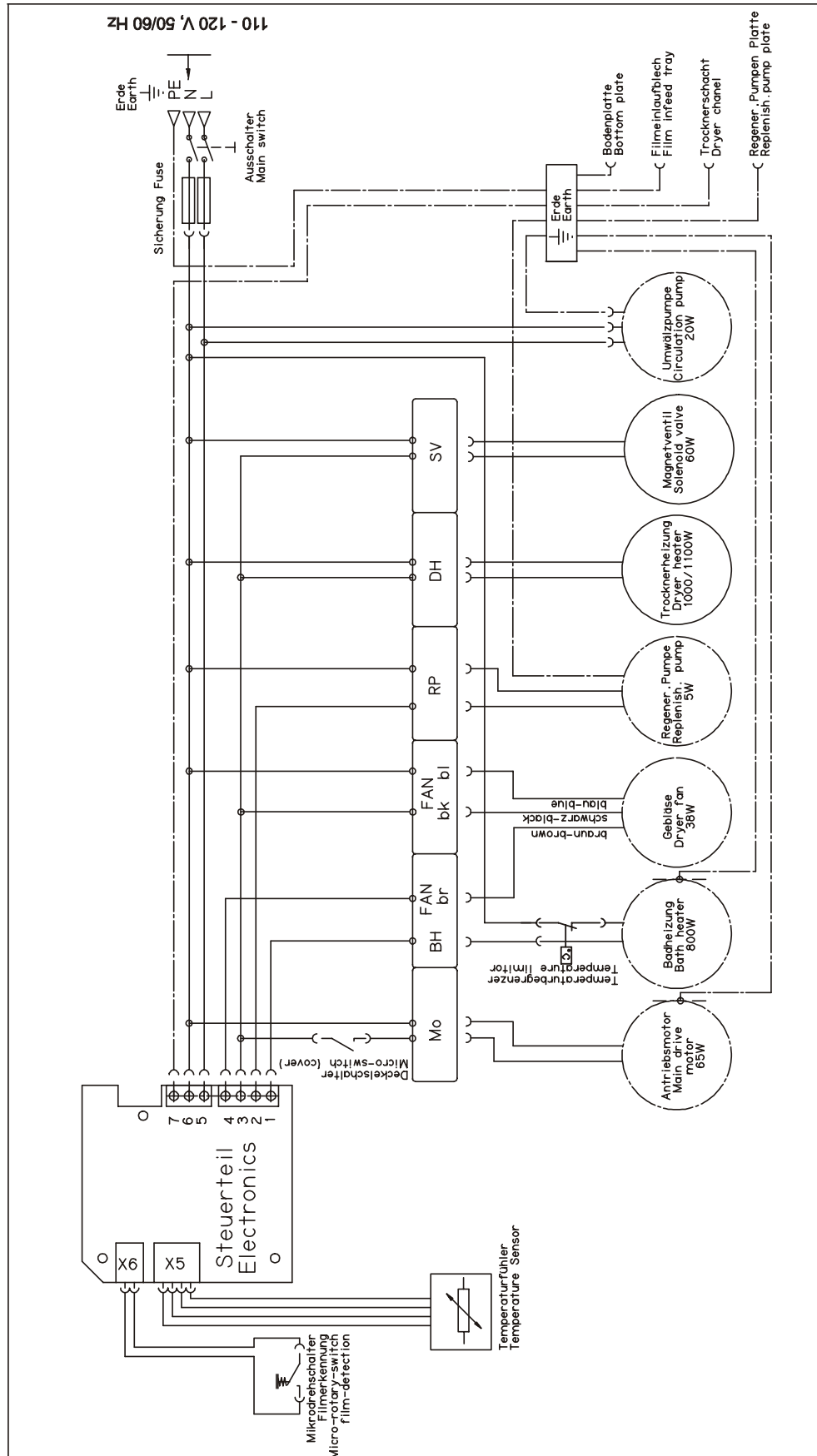
Spare Parts Kit - Large, Part No. 1F8089

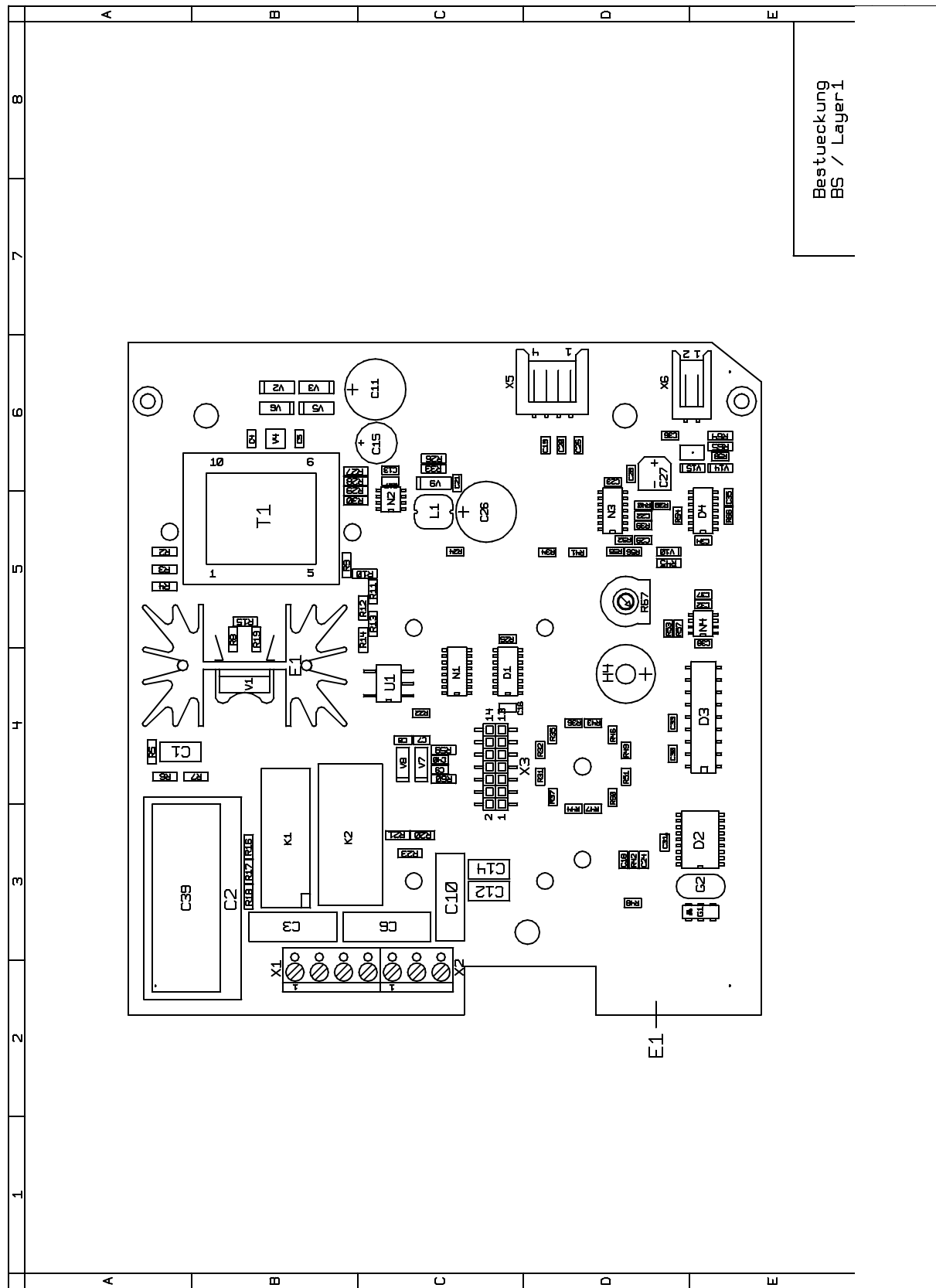
Pos.	Description	Qty.	Comments
20a	Replenishment Valve	4	Also included in Small Parts Kit 1F7975
-	Fastener	3	
-	Fastener, blue	1	
-	Fastener, red	1	
-	Ring clamp	5	
113	Worm wheel	4	
123	Flat spring 35	10	
105	Flat spring 55	10	
22 & 23	Main switch	2	
-	Regulating knob, grey	1	
-	Adjuster for knob, grey	1	
-	Tube clamp SGT 8-16/9 C7 W2	10	
-	Tube clamp Snap	4	
-	Wire tube clamp	10	
26	Micro switch, top cover	1	
27	Operator for micro-switch	1	
63	Temperature sensor	1	
62	Temperature safety switch	1	
-	Drain stop cock	2	
110	16 tooth gear D-hole	10	
112	32 tooth gear D-hole	3	
111	32 tooth gear round-hole	8	
114	Bearing	30	
115	Bearing - large	10	
116	Black circlip	50	
-	Screw WN 1411 KB 40x16	10	
-	Screw M4x10 A4	10	
-	Screw WN 1412	5	
107	Hexagonal nut M4 A4 DIN 934	10	
34	Bearing block	3	
33	Worm gear	3	
38	Splint pin 2.0x20 DIN 94 A4	3	
56	Film detection switch, UL	1	
51	Dryer heating element, 110 V, 900 W, UL	1	Can order separately as Part No. 1F7957
54	Solenoid valve, UL	1	Can order separately as Part No. 1F7960
21	Circulation pump	1	Can order separately as Part No. 1F7954
25	Circuit Board, 110 - 120 V	1	Can order separately as Part No. 1F7955
108	PU roller 35 ground	3	Can order separately as Part No. 1F7970
119	Rubber roller 35	2	Can order separately as Part No. 1F7971
60	Developer heating element, 120 V, 400 W	1	Can order separately as Part No. 1F7962
20	Replenishment pump	1	Can order separately as Part No. 1F7953

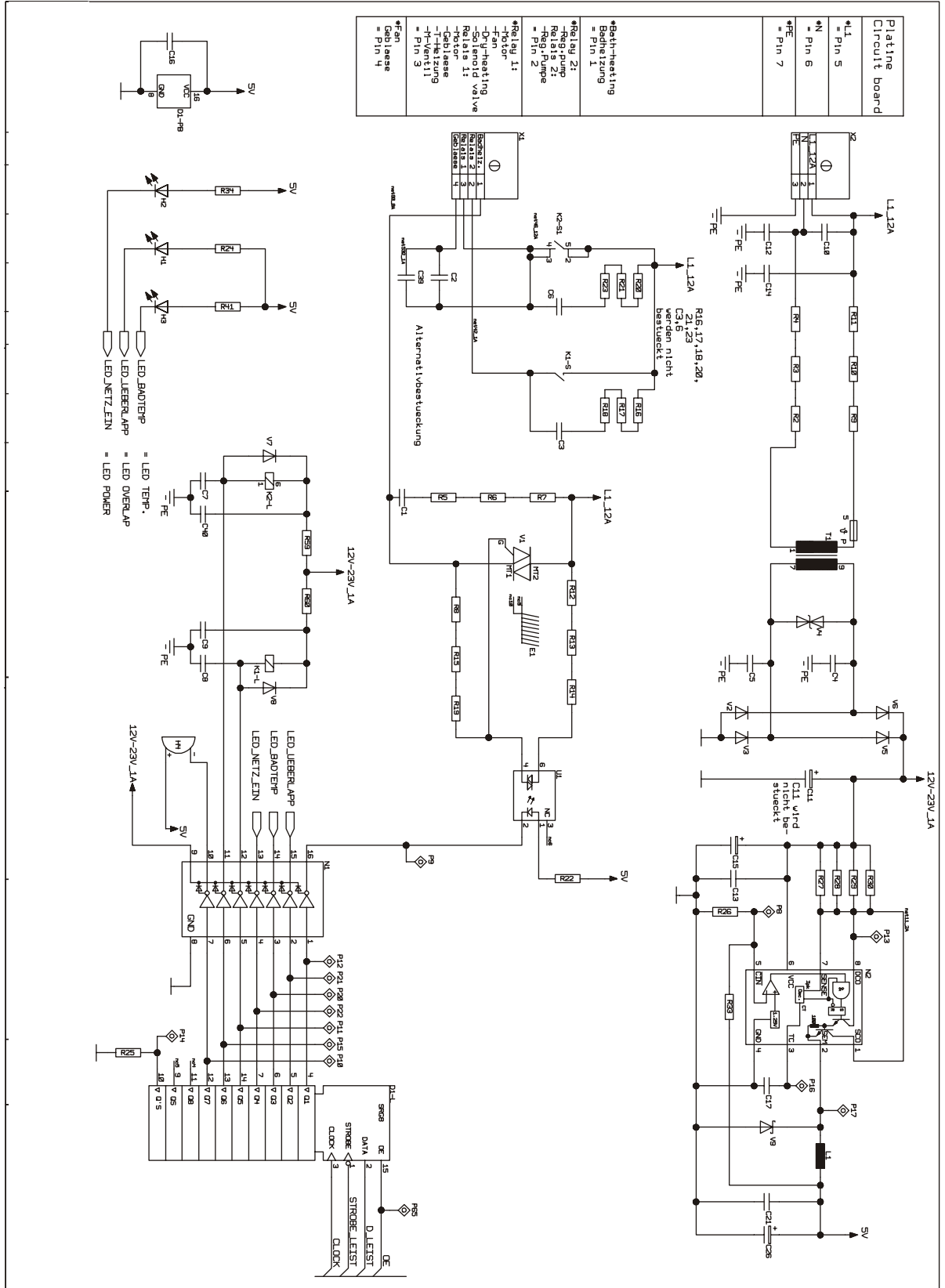
Spare Parts

Spare Parts Kit - Small, Part No. 1F7975

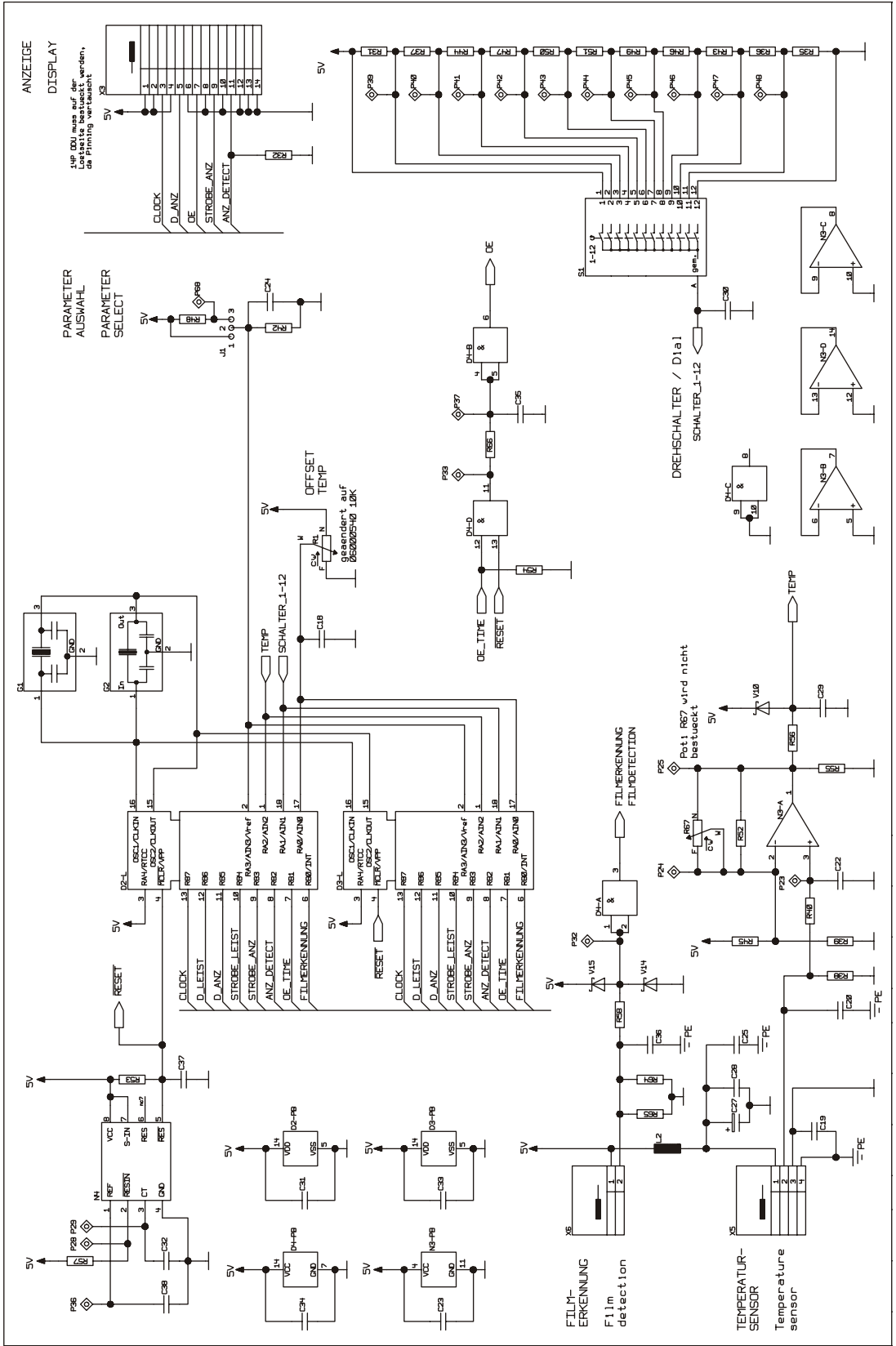
Pos.	Description	Qty.
-	Fastener	3
-	Fastener, blue	1
-	Fastener, red	1
-	Ring clamp 8-sw pbt	5
-	Regulating knob, grey	1
-	Adjuster for knob, grey	1
-	Tube clamp sgt 8-16/9 C7 W2	10
-	Tube clamp snap	4
-	Wire tube clamp	10
-	Drain stop cock	2
-	Pt-screw WN 1411 KB 40x16	10
-	Pt-screw WN 1412	5
20a	Valve replenishment	4
26	Micro-switch	1
27	Operator for micro-switch	1
33	Worm gear	3
34	Bearing block	3
38	Splint pin, 2.0x20 DIN 94 A4	3
22 & 23	Main switch, UL	2
56	Switch film detection	2
62	Temperature safety switch	1
63	Temperature sensor	1
105	Flat spring 55	10
106	Screw M4x10 A4	10
107	Hexagonal nut M4 A4 DIN 934	10
110	16 tooth gear d-hole	10
111	32 tooth gear round-hole	8
112	32 tooth gear d-hole	3
113	Worm wheel	4
114	Bearing	30
115	Bearing - large	10
116	Black circlip	50
123	Flat spring 35	10







Steuer1.cdr



Steuer2.cdr